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Chapter Fourteen

PLAN PREPARATION

Other Parts of the *Indiana Design Manual* provide the designer with uniform criteria and procedures for the design of a highway facility. These designs must be incorporated into the construction plans so that they can be clearly understood by contractors, material suppliers, and Department personnel assigned to inspect the construction of the project. To ensure a consistent interpretation of the construction plans, individual sheets should have a standard format and content, and the sequence of plan assembly should generally be the same. Chapter Fourteen provides the general information and details necessary to prepare a complete set of road, bridge, signing, signals, lighting and channelization construction plans. Chapter Eighty-five discusses criteria for the preparation of right-of-way plans. In addition to the information provided in this Chapter, the *INDOT Typical Plan Sheets* provides sample construction plans sheets and guidance on what information should appear on each sheet.

14-1.0 PLAN DEVELOPMENT

14-1.01 Responsibilities

Figure 14-1A, Road, Bridge and Traffic Projects (Sheet Preparation Responsibilities), illustrates who is responsible for preparing the various details of in-house designed projects. For consultant-designed plans, the consultant will be responsible for the preparation of all plan sheets. For projects that are longer than 1.5 km, interchanges, rest area or weigh station projects, separate signing and lighting plans will typically be required.

The designer will initially complete all plan sheets, computation sheets, quantity estimates and cost estimates. A second qualified individual will independently review these items. The qualifications of the checker should be commensurate with the item to be reviewed. For example, a second drafter would be qualified to check the preliminary drafting, but an engineer will generally be required to review the structural details and computations for a bridge design.

At several design stages the plans will be submitted to various Department units for review. Section 14-2.0 identifies the construction plan sheets that should be completed at the various design stages.

Prior to any of these submissions, the project manager is responsible for ensuring that all appropriate information has been incorporated onto the plans or is included with the plans; the

plans are consistent; all comments from previous submittals have been addressed; all calculations have been checked; and the overall content meets the Department's criteria.

14-1.02 Project Development

Chapter Two illustrates the steps the designer should follow when preparing a set of construction plans. Using this process will ensure that all appropriate information will be addressed in the construction documents. The following sections briefly discuss the project development relative to the plan sheets.

14-1.02(01) Project Initiation

The Environment, Planning and Engineering Division is responsible for preparing the Engineer's Report. This Report provides the scoping information the designer requires to initiate the project design. Chapter Five discusses the typical contents of an Engineer's Report.

Prior to beginning design on an existing facility, the designer should review the as-built plans and/or the final design plans. Final design plans are on file, on microfilm, in the Central Office. The actual as-built plans and/or microfilm are located in the districts. The district office is responsible for correcting the final design plans to reflect the as-built conditions. For traffic signal projects, the final design plans will be corrected to the as-built condition and stored within the Design Division's traffic signal design unit.

Although the as-built plans are an important resource, the designer will typically conduct a field review and/or have a survey conducted for every road or bridge project. Section 14-3.0 discusses how to incorporate the survey data into the construction plans. For most traffic signal, signing and lighting projects, a survey will generally not be performed. However, a field review will still be required.

14-1.02(02) Field Checks - Consultant Projects

Consultants preparing plans for INDOT projects are responsible for preparing and distributing plans for all field checks. This will consist of the following:

1. INDOT Review. Prior to the field review, consultants are required to forward one set of plans to the Central Office. If the plans are satisfactory for a field check, INDOT will notify the consultant to schedule the field check. If the plans are not satisfactory,

marked-up plans will be returned to the consultant for re-submittal.

2. Meeting Date. The consultant is responsible for arranging a mutually agreeable field check date with the INDOT project manager and the district construction area engineer. In general, the field check meeting should be scheduled at least three weeks in advance.

3. Plan Distribution. The consultant is responsible for preparing field check notification letters and plans so that they are received by all parties on the distribution list at least two weeks prior to the field check. Plans distributed within the Central Office may be delivered to the applicable Design Division project coordinator. Send all other plans and letters directly to the necessary individuals. See Figure 14-1B, Sample Field Check Notification Letter.

4. Field Check Report. After the field check has been completed, the consultant will be responsible for preparing the report of meeting and listing the comments from all individuals involved in the field check. Copies of this report will be distributed to all those involved in the field check and to those individuals listed in the distribution in Figure 14-1B.

14-1.02(03) Final Tracing Submittal

The project manager will submit the final tracings to the project coordinator. The project coordinator will submit the plans to the Records Unit. This submittal will include the following:

1. one set of final plans (mylar) and cross sections (reproducible vellum or mylar);

2. set of marked-up final check prints;

3. two sets of prints;

4. a 3.5-in. diskette or CD-ROM containing the following:

    a. final cost estimate (on Estimator), with a separate estimate prepared for each Des number, using the most recent bid history and pay item list files;

    b. one Recurring Special Provisions Menu in Microsoft Excel, covering all Des numbers in the contract. The Menu may be found on the Department's web site, atwww.ai.org/dot/div/contracts/standards/rsp/index.html;

c. modified recurring special provisions and unique special provisions in Microsoft Word.

5. three hard copies of the final cost estimate and four hard copies of the special provisions;

6. two copies of the Memorandum to Contracts Services Section which contains information on the status of permits, right-of-way, etc. This form may be found on the Department's web site, at www.ai.org/dot/div/contracts/design/pdf/contract.pdf;

7. four copies of permits or permit information;

8. subsurface investigation, or geotechnical summary;

9. Scope/Environmental Compliance Certification/Permit Application Certification Form. This form may be found on the Department's web site, at www.ai.org/dot/div/contracts/design/pdf/scopeenvfrm.pdf;

10. one bound copy of the design computations and two copies of the quantity calculations;

11. project correspondence files;

12. original survey book(s) and electronic survey files on 3.5 in. diskette or CD-ROM;

13. bridge search data form. The form may be found on the Department's web site at http://www.ai.org/dot/div/contracts/design/pdf/bridge_search_data_form.pdf

14. quality assurance form. The form may be found on the Department's web site at http://www.ai.org/dot/div/contracts/design/pdf/quality.pdf:

15. asbestos certification (for new bridge construction, bridge replacement, or bridge rehabilitation projects), original to the appropriate district bridge inspector and a copy to the Environment, Planning and Engineering Division's environmental services manager;

16. Geotechnical Review of Final Check Prints form; and

17. Limited Review Certification. The form may be found on the Department's web site at http://www.ai.org/dot/div/contracts/design/pdf/Limited_Review_Certification.pdf

The Scope/Environmental Compliance Certification/Permit Application Certification Form, design computations, quantity calculations, project correspondence files and survey books are maintained in the Records Unit as a reference file for the project. Two sets of prints from the final plans, the disk, cost estimate, special provisions, copies of permits or permit information,

Federal Fiscal Management Form (completed by the Records Unit) and the Memorandum to Contracts Services Section are submitted to Contracts and Construction Division's Contracts Services Section.

The Records Unit enters the preliminary data on the project into BAMS at this time. The information is processed by the designation number. If there is more than one designation number, the data must be entered for each designation number and the cost estimates segregated by the designation number.

The Records Unit prepares the original tracings for letting. Contract numbers and project numbers are checked, reference points are checked, designation numbers are checked and a memorandum is prepared for the signature of the plans. The plans are signed and dated by the project designer and the Design Division Chief.

14-1.02(04) Plan Revisions Prior to Letting

Any changes made to the tracings after a project is turned in to the Design Division's Records Unit, but before bids are opened, should be handled as follows:

Changes are made to the tracings with a revision note placed in the revision block on the title sheet (bridge projects) or index sheet (road projects). This revision note should contain the date of the revision, the revised sheet numbers, and a short explanation of the changes. A note should also be placed on the revised sheet or sheets in a location that will not restrict its visibility.

1. Erasures are permitted from the time the tracings are turned in to the Records Unit until the plans are printed for distribution to potential bidders or others. This is approximately 5 weeks before the letting date. Within this 5-week period, revisions may only be made to the tracings with the approval of the appropriate district construction engineer. Such revisions are to be shown in "clouds." Although with electronic drafting it is common for the designer to delete a sheet and substitute a new one in its place, the designer should still use "clouds" to assist plans users in finding the changes on the new sheet.

2. Revise the special provisions, noting all changes, if needed.

3. Revise quantities and construction cost estimate if needed.

4. Submit the revised tracings, special provisions package, quantity computations, construction cost estimate using Estimator, and diskette or CD-ROM containing the unique special provisions and construction cost estimate.

5. No changes are permitted one week prior to the letting date.

Note that the letting date, and not the plan signing date, controls when and how revisions can be made to the plans.

14-1.02(05) Contract Information Book Certification

Within one week after receipt, the designer should review the plans and Contract Information book for each contract for which the designer is signing and sealing some or all of the plan sheets. The designer should complete the Contract Proposal Book Certification form and send the original to the appropriate district construction engineer with copies to the Contracts and Construction Division's Contracts Section. The form may be found on the Department's web site at
http://www.ai.org/dot/div/contracts/design/pdf/contract_proposal_book_cert.pdf. Sections and the Design Division's project coordinator. If errors are noted, the designer should also contact the appropriate district construction engineer to determine how the errors should be handled (as revisions before the letting date, construction changes after the letting date, etc.). This determination should be documented in a memorandum to the appropriate district construction engineer with copies to the Contracts Section and project coordinator.

14-1.02(06) Construction Changes

Any changes made after a project is let and awarded must be processed as a construction change. Construction changes are processed as follows:

1. Plan Sheets. Where changes are made to the tracings, a revision note should be placed in the revision block on the Title Sheet for bridge projects, or the Index Sheet for road projects. This revision note should contain the date of the revision, the revised sheet numbers and a short explanation of the changes. A note should also be placed on the revised sheet or sheets in a location that will not restrict its visibility. No erasures may be made to the original tracings because they are considered a legal contract document at the time of letting.

   If space allows, the original item to be revised should be hatch marked through and the revision should be made on the same sheet. The revision should be placed on the sheet in a location that will not restrict visibility, and should be shown in a "cloud." If the

revision is too large to be shown on the original sheet, the deleted sheet number should be noted in the revision block. This deleted sheet should remain in the original set of plans. A new sheet should be added to the original set of plans with the same sheet number as the deleted sheet followed by an alpha character (e.g., Delete Sheet 7, Add Sheet 7A). Revisions on the new sheet should also be shown in "clouds."

2. Records Unit. A memorandum will be prepared by the Design Division's Records Unit to the district construction engineer (see Figure 14-1C, Worksheet for Construction Change Orders). Six sets of full-size plans should accompany this memorandum to the District. Any quantity revisions are computed and transmitted by the designer with the memorandum for use by the Project Engineer in preparing Form IC-626.

3. Distribution. A half-size set of plans and a copy of the memorandum should be distributed to the following:

   a. the Federal Highway Administration, if applicable;
   b. the contractor;
   c. the project engineer;
   d. Contracts and Construction Division;
   e. Land Acquisition Division, if R/W revised;
   f. Design Division's project manager;
   g. the consultant, if applicable;
   h. Program Development Division's Bridge Inventory Unit, if a bridge project; and
   i. Design Division's Records Unit.

14-1.02(07) Shop Drawings

On many projects, the contractor will be required to submit shop drawings to the Department for review and approval. It is recommended that the original plans and contract documents be used in reviewing shop drawings. For shop drawings, the following will apply.

1. Cover Memorandum. The cover memorandum accompanying the shop drawings should include the following:

   a. contract number;
   b. designation number;
   c. route/road location;
   d. district; and
   e. exact description of the item(s) being submitted.

2. Structures. For concrete structural members, structural steel and expansion joints, the procedure for reviewing shop drawings will be as follows:

   a. The fabricator will provide the shop drawings to the designer for review and approval.

   b. After the shop drawings have been reviewed and approved, the designer will forward the approved drawings to the Operation Support Division for distribution.

   c. The designer will provide one set of prints to the Records Unit for filing.

   d. After fabrication is completed, the fabricator will submit one set of mylar prints directly to the Design Division's Records Unit supervisor. These mylars are stored in the vault until they are microfilmed.

   e. The microfilm of the shop drawings is stored in the Design Division's Records Unit.

3. Pipe, Guardrail, Handrail and Bridge Rail. Shop drawings for these items are to be reviewed by the district's project engineer.

4. Traffic Projects. For signing, lighting and traffic signals items, Figure 14-1D, Shop Drawing Review Responsibility (Traffic Items), indicates the responsible review unit for shop drawings. After the shop drawings have been approved, the designer should distribute two copies of the approved drawings as noted in Item 7.

5. Local Agency Projects. Shop drawings for local agency projects should be submitted to the local agency for review and approval.

6. Other Shop Drawings. For all shop drawings other than those listed above, the fabricator will provide the shop drawings to the designer for review and approval. After the shop drawings have been approved, the designer will distribute the approved drawings to individuals listed in Item 7.

7. Distribution. After shop drawings have been approved, they should be distributed to the individuals as follows:

   a. designer (Traffic - see Item 4);
   b. fabricator;
   c. contractor (Traffic - see Item 4);
   d. shop inspector;
   e. Records Unit; and

f. construction engineer (Traffic drawings only – see Item 4).

14-2.0 PLAN SHEET SUBMISSIONS

The designer should submit a Level One Checklist, including computations, with each submission, for the mainline, each S-line, and each traffic maintenance phase. In addition, the designer should include computations for the required intersection sight distance at each public road, including local service roads and frontage roads within the project limits. The designer should also submit documentation of the intersection sight distance provided at each public road. This requirement also applies to the traffic maintenance phases. The designer should submit a completed Limited Review Certification form for projects at the final check prints and final tracings stages.

The computations for the Level One items and intersection sight distance are to be initialed and dated by the designer and reviewer before submission to INDOT.

If there are no changes to the plans which affect Level One criteria since the prior submission, it is acceptable to copy the previous Level One Checklist and add a statement that no changes have been made to the plans that affect Level One criteria. The statement should be initialed and dated for the current submission.

14-2.01 Road Design Plans (New Construction/Reconstruction Projects)

14-2.01(01) Grade Review Submission/Hydraulic Review Submission

It is not necessary to submit a Level One checklist for an S-line that does not exceed the work necessary to build the appropriate public road approach, including the required taper distance to account for transitioning to the existing pavement width. This does not relieve the designer of making the project meet all Level One design elements in this area, e.g., maximum grade, vertical stopping sight distance, and intersection sight distance.

The proposed design information for this submittal should be plotted on CADD. However, the plans do not need to be in final form. The designer is encouraged to add notes on the plans explaining special situations or items which are not readily apparent which may influence the proposed design. These notes are to be removed in later submissions. The following sheets and information must be reviewed for Quality Assurance and included with this submission:

1. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and note any apparent or possible design exceptions. Also note any discrepancies from the Level Two design criteria listed in Section 40-8.02(02).

2. Title Sheet. At this project stage, information on the Title Sheet should include the following:

   a. project numbers;

   b. project Des numbers;

   c. county location map;

   d. project location map including north arrow and scale;

   e. description of the project work type and location;

   f. reference points at the beginning and end of the project (not required for local agency projects);

   g. project length;

   h. design data including design speed, project design criteria, functional classification, terrain, traffic data, etc.; and

   i. signature block(s); note that these blocks will not be filled in at this stage.

3. Index and General Notes Sheet. The Index and General Notes Sheet should provide a list of utility owners and addresses. The index blocks should be completed to indicate the sheet numbers for the plans at this stage. Note that the sheet numbers will change for future submittals.

4. Typical Cross Sections. Typical cross sections for this submittal should only show basic configuration and design features. This will typically include the following:

   a. lane and shoulder widths;
   b. profile grade, construction centerline, paper relocation line and survey line locations;
   c. cross slopes;
   d. curbs;
   e. sidewalk locations and widths;

f. bicycle facilities;
g. side slopes; and
h. ditches.

5. Plan and Profile Sheets. At this project stage, the plan and profile will generally only include the preliminary design information. Plotting of the existing topography should be complete. Some of the details that should be addressed include the following:

   a. horizontal alignment (e.g., horizontal curve data, PC, PI, PT, bearings);

   b. vertical alignment and its relationship to grade controlling features;

   c. any alignment controlling features (e.g., high-water levels, existing cross roads and bridges, regulated drains, drainage structures, railroads, underdrain criteria, traffic maintenance considerations, cemeteries, historical buildings, parks, ADA requirements); and

   d. preliminary drainage details, e.g., bridges and mainline culverts.

6. Interchanges. Projects with interchanges should include the general layout of the interchange including preliminary ramp gradients, horizontal alignment, vertical alignment, etc.

7. Cross Sections. Provide sample cross sections through critical areas.

8. Design Information. In addition to the plans, the designer should include copies of the preliminary hydraulic analysis for mainline culverts, if applicable, and results of any economic analysis that may have been completed for alternative grade lines.

9. Certification. Include an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification Form.

14-2.01(02) Interchange Geometrics Submission

For projects involving interchanges, a separate submittal of the proposed horizontal alignment for the interchange may be required prior to the Grade Review. The following elements must be reviewed for Quality Assurance and included with this submission:

1. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and note any apparent or possible design exceptions.

Also note any discrepancies from the Level Two design criteria listed in Section 40-8.02(02).

2. Geometrics. The plan sheets for the interchange geometrics should be graphically completed including stationing, curve data, bearings, etc. The design speeds for ramps should be noted.

3. Ramp Grades. Investigate ramp grades in as much detail as required to determine their effect on the proposed horizontal alignment.

4. Traffic Elements. The traffic elements to be reviewed to determine their effect on the interchange alignment are as follows:

   a. traffic counts and turning movements;
   b. consideration of signing;
   c. consideration of signals at ramp terminals; and
   d. consideration of illumination (high mast or conventional).

5. Design Information. Include all applicable design information with this submission (e.g., economic analysis, drainage analysis).

14-2.01(03) Preliminary Field Check Plans

Plans should be approximately 40% complete at this stage. The following sheets and information must be reviewed for Quality Assurance and included with this submission.

1. Previous Reviews. The marked-up plans from the previous submittal should be include with this submission, i.e., Grade Review and/or Interchange Geometrics.

2. Conformance. The plans should be reviewed for conformance with the Level One controlling design criteria listed in Section 40-8.02(01). Any apparent or possible design exceptions should be noted. Also, any discrepancies from the Level Two design criteria listed in Section 40-8.02(02) should be noted. The required documentation for all Level One and Level Two design exceptions should be submitted.

3. Plat Sheet. A preliminary Plat No. 1 should be included for all non-local-agency projects requiring right of way. See Section 85-2.0.

4. Plan and Profile Sheets. Elevations and grades of ditches should be shown so that accurate right-of-way requirements can be determined. In addition to the criteria required for prior submittals, the plan and profile sheets should include the following:

   a. project limits;

   b. drainage features (e.g., pipe structures, ditch grades, and preliminary inlet spacing for storm-sewer trunk line design) and proposed drainage notes;

   c. public road approach and drive locations;

   d. construction limits;

   e. proposed right-of-way;

   f. approximate roadside barrier locations;

   g. permanent erosion protection, including paved side ditches, riprap, sodding limits; and

   h. new sidewalks, bicycle lanes, etc. (if not shown on the detail sheets).

5. Detail Sheets. The preliminary layouts or sketches for the detail sheets should be included as follows:

   a. major intersections, including turning movements, turn lanes and pavement markings;

   b. signals;

   c. signs, including sign structures;

   d. lighting;

   e. retaining walls;

   f. special drainage structures;

   g. superelevation transition diagrams;

   h. weigh stations and associated facilities; and

i. rest areas and associated facilities.

6. Traffic Maintenance Details. The proposed traffic maintenance scheme and phasing should be outlined.

7. Approach Table. The preliminary information to be included in the approach table is as follows:

a. location (station);
b. type of approach;
c. radii;
d. width of approach;
e. length of approach;
f. grade of approach;
g. surface materials; and
h. distance beyond R/W.

8. Structure Data Table. The preliminary information to be included in the structure data table is as follows:

a. location;
b. size;
c. type;
d. approximate elevations and grades where necessary for clarity; and
e. type of end section.

9. Cross Sections. The preliminary draft for the cross sections should include the following:

a. profile grade elevations;
b. templates of the typical sections placed on the existing cross sections;
c. drainage structures;
d. approaches and drives; and
e. buildings.

10. Design Information. Include the preliminary draft of the Design Summary and the draft Fish and Wildlife Review, if applicable. The preliminary storm sewer analysis should also be included with this submittal. Unique special provisions should be initiated with this submittal.

14-2.01(04) Design Hearing Plans and Preliminary Right-of-Way Plans Submission

Plans for this submittal should be close to their final form. The construction plan sheets for this submittal should be legible and consistent with the quality desired for public viewing. If one or more ramps are to be closed for 7 days or longer, a public information meeting will be required. The procedure for such meeting should be in accordance with Section 14-02(02). The right-of-way plans should be consistent with the requirements in Chapter Eighty-five. The designer should review the *INDOT Typical Plan Sheets* document to determine what information should be included on each sheet. Review the following sheets and information for Quality Assurance and include them with this submission.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Title Sheet. Finalize the Title Sheet for right-of-way plans.

3. Index and General Notes Sheet. Prepare the right-of-way index.

4. Plat Sheets. All plat sheets, if required, should be consistent with the plans.

5. Plan and Profile Sheets. Right of way should be finalized and consistent with the detail sheets. Storm-sewer design should be complete and should be included in the plans.

6. Design Information. In addition to the construction plans, this submittal should include an updated cost estimate for the project and a copy of the draft Design Summary. The Department's cost estimating procedures should be used for the preliminary construction cost estimate; see Chapter Twenty. Quantities will generally consist only of major items with a percentage added to cover smaller items. If practical, the traffic-related items should be segregated.

7. Certification. Include an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification Form.

14-2.01(05) Right-of-Way Tracings Submission

Chapter Eighty-five presents the criteria and information that should be included with a set of right-of-way plans. In addition, the designer should review the instructions for Quality Assurance as follows:

1. include the marked-up preliminary right-of-way plans with this submission, if requested to do so;

2. incorporate all revisions made during the Preliminary Right-of-Way Plans Submission review;

3. complete all sheet cross references;

4. complete all project information boxes in the right-of-way plans, including right-of-way project number and sheet numbers; and

5. complete the checklist shown in Figure 85-2F.

14-2.01(06) Final Design Summary Submission

Submit a request for the final pavement design to the Materials and Tests Division at this time. Include and review these elements for Quality Assurance as follows:

1. plan revisions resulting from the Design Hearing comments;

2. environmental requirements satisfied by either of the following:

    a. The Environmental Impact Statement is complete and the Record of Decision (ROD) has been issued;

    b. The Environmental Assessment is complete and a Finding Of No Significant Impact (FONSI) is made by the Federal Highway Administration; or

    c. The Categorical Exclusion is complete. If there is a line on which the Federal Highway Administration is to sign, it must be signed;

3. a final Design Summary, including the resolution of hearing comments;

4. permit information as required; and

5. updated Scope/Environmental Compliance Certification/Permit Application Certification Form.

14-2.01(07) Final Field Check Plans Submission

If a Final Field Check is required, the designer should complete the following and review these elements for Quality Assurance.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Plan Sheets. The plans should be nearly complete. Changes from the Design Hearing, soils recommendations and pavement design recommendations should be incorporated onto the plans. Legends on sheets should be completed and checked for accuracy and consistency with Section 14-3.04. In addition, the designer should consider the following for the plan sheets.

    a. Title Sheet. Complete the Design Data Block and include the ESAL for the pavement design.

    b. Index and General Notes Sheet. Check the general notes to ensure they are up-to-date and accurate. Revise the index as necessary.

    c. Plan and Profile Sheets. Ensure that structure notations are completed; sodding, riprap and paved sodded ditch locations are indicated; earthwork balances are shown; and removal items noted.

    d. Detail Sheets. Ensure all details are completed and included with this submission. This includes details for temporary erosion control, traffic maintenance details, and traffic design elements (e.g., intersections, signals, signing and lighting).

    e. Tables. Complete all data tables including the following:

        (1) structure data table;
        (2) approach table;
        (3) underdrain table;
        (4) paved side ditch and sodding table;
        (5) guardrail table; and
        (6) sign summary table.

    f. Cross Sections. Design information on cross sections should be essentially complete. This includes final structure notations, earthwork areas and volumes, and benching areas and volumes.

3. Preliminary Cost Estimate. An updated preliminary construction cost estimate is required at this time. Quantities for all major items should be included in the cost estimate. Miscellaneous pay items previously accounted for as a percentage of the cost estimate and which are not required to complete tables in the plans do not need to be quantified at this time.

4. Computations and Miscellaneous Documents. Include the computations, quantities, and other documents with this submission as follows:

   a. final drainage design;
   b. structure quantities;
   c. underdrain quantities;
   d. sodding, riprap, and paved side ditch quantities;
   e. preliminary earthwork quantities;
   f. paving quantities for the approach table;
   g. signing, traffic signals, illumination and pavement marking quantities; and
   h. preliminary special provisions.

14-2.01(08) Final Check Prints Submission

The purpose of this submittal is to ensure the plans are complete and meet the criteria presented in the Engineer's Report and the Design Summary. The following should be completed and reviewed for Quality Assurance.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and note any approved dates for any design exceptions.

3. Pavement Design. Incorporate the final pavement design into the typical cross sections and quantities.

4. Quantities. Finalize all quantities and include a bound copy.

5. Reports. Ensure that the recommendations from the Geotechnical Report and other reports regarding peat, hazardous waste, special waste, etc. have been incorporated into the plans, specifications and cost estimate.

6. Cost Estimate. Conduct a detailed review to ensure that all necessary items have been included. Finalize the construction cost estimate using Estimator.

7. Certification Form. Include a copy of the Scope/Environmental Compliance Certification/ Permit Application Certification Form.

8. Special Provisions. Complete the special provisions including special provisions for non-standard items.

9. Erosion Control Plans. Include the completed set of erosion control plans.

10. Rule Five. If required, and not previously submitted in accordance with Section 9-1.02, complete the Rule Five Submission as described in Chapter Thirty-seven.

14-2.01(09) Final Tracings Submission

Complete the following and review these instructions for Quality Assurance.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Identification Numbers. Ensure that the proper contract, project, and sheet numbers are included on all sheets. The designer should contact the Design Division's Records Unit to obtain the contract number.

3. Signatures. Have the appropriate individuals complete the signature blocks on the appropriate sheets.

4. Submittal. Review the procedures in Section 14-1.02(03) for guidance on submitting the final tracings to the Project Coordinator and Records Unit.

14-2.02 Road Rehabilitation Plans for Projects with No Additional Right of Way Required

14-2.02(01) Grade Review Submission/Preliminary Field Check

For 4R projects with realignment, a separate Grade Review Submission and a Preliminary Field Check Submission will be required. For information on Grade Review Submission, see Section

14-2.01(01). For 4R projects with no realignment and for 3R projects, only a Preliminary Field Check Submission will be required.

The designer should invite a representative from each of the affected local public agencies (counties, cities, or towns) to the field check. If one or more local agencies are not represented at the field check, the designer should contact them and meet with them independent of the field check.

It is not necessary to wait until the preliminary field check to initiate the geotechnical investigation. As soon as possible, the designer should provide the Materials and Tests Division's Geotechnical Section with the information as follows:

1. Location (SR, US, or I-___ from _____ to _____);

2. Anticipated pavement treatment, i.e., resurface, rubblize, etc., from the scope or mini-scope; and

3. Locations where the pavement will be widened.

If there is a change in scope after the above information is provided to the Geotechnical Section, the designer should immediately notify the Geotechnical Section.

The proposed design information for this submittal should be plotted on CADD. The designer is encouraged to add notes on the plans explaining special situations or items which are not readily apparent which may influence the proposed design. These notes must be removed in later submissions. The following sheets and information must be reviewed for Quality Assurance and included with this submission.

1. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and note any apparent or possible design exceptions. Also note any discrepancies from the Level Two design criteria listed in Section 40-8.02(02). Submit the required documentation for all Level One and Level Two design exceptions.

2. Title Sheet. At this project stage, the Title Sheet should include the information as follows:

    a. project numbers;

    b. Des numbers;

c. county location map;

d. project location map including north arrow and scale;

e. description of the project work type and location;

f. reference points at the beginning and end of the project (not required for local agency projects);

g. project length;

h. design data including design speed, project design criteria, functional classification, terrain, traffic data, etc.; and

i. signature block(s), though not to be completed at this stage.

3. Index and General Notes Sheet. The Index and General Notes Sheet should provide a list of utility owners and addresses. Include any general notes that are known at this time. The index blocks should be completed to indicate the sheet numbers for the plans at this stage. Note that the sheet numbers will change for future submittals.

4. Typical Cross Sections. Typical cross sections for this submittal should show typical configuration and design features. This will typically include the following:

a. lane and shoulder widths;

b. profile grade, construction centerline, paper relocation line and survey line locations;

c. detailed pavement design, if available from the Engineer's Report; at a minimum, note whether the design will consist of resurfacing, crack and seating, rubblizing or pavement replacement;

d. roadway cross slopes;

e. curbs;

f. underdrains, with location shown relative to pavement;

g. side slopes;

h. ditches; and

i. clear zones on 4R projects.

5. Plat Sheet. For all projects requiring right-of-way acquisition, include a preliminary Plat No.1. See Section 85-2.0. A plat sheet is not required for local agency projects.

6. Plan and Profile Sheets. At this project stage, the plan and profile design information will generally be essentially completed. Some of the details that should be addressed include the following:

a. complete the plotting of the existing topography;

b. project and construction limits;

c. proposed or existing right-of-way limits;

d. horizontal alignment (e.g., horizontal curve data, superelevation, PC, PI, PT, bearings);

e. vertical alignment and its relationship to grade controlling features;

f. any alignment controlling features (e.g., high-water levels, existing cross roads and bridges, regulated drains, drainage structures, railroads, underdrain criteria, maintenance of traffic considerations);

g. drainage features (e.g., storm sewers, pipe structures, structure end treatment, ditch grades) and proposed drainage notes;

h. approximate roadside barrier locations;

i. permanent erosion protection, including whether paved side ditches, riprap or sodding will be required;

j. temporary erosion control details; and

k. permanent median crossovers. For approved locations, see Chapter Fifty-four.

7. Interchanges. Projects with interchanges should include the general layout of the interchange including ramp gradients, horizontal alignment, vertical alignment, etc.

8. Detail Sheets. The preliminary layouts or sketches to be included are as follows:

a. major interchanges and/or ramp intersections, including turning movements, turn lanes and pavement markings;

b. signals;

c. signs, including sign structures;

d. lighting;

e. pavement markings;

f. retaining walls;

g. special drainage structures;

h. spot elevations;

i. superelevation transitions diagrams;

j. weight stations; and

k. rest areas.

9. Traffic Maintenance Details. The proposed traffic maintenance scheme and phasing should be outlined including traffic crossovers, ramp closures, number of through lanes maintained in each direction, etc.

10. Approach Table. The preliminary information to be included in the approach table if crossroads are involved is as follows:

a. location (station);
b. type of approach;
c. radii;
d. width of approach;
e. length of approach;
f. grades of approach;
g. pavement thickness;
h. surface materials; and
i. distance beyond R/W.

11. Structure Data Table. The preliminary information to be included in the structure data table is as follows:

a. location;
b. size;
c. type;
d. approximate elevations and grades where necessary for clarity; and
e. type of end section.

12. Sign Summary Table. The sign location (station) and type (sign code) should be noted on the sheet. However, the sign size, summary columns and post size do not need to be completed at this project stage.

13. Guardrail Summary Table. Complete the applicable information for the table.

14. Cross Sections. The preliminary draft for the cross sections should include the following:

a. profile grade elevations in areas with new full depth pavement;
b. templates of the typical sections placed on the existing cross sections;
c. drainage structures;
d. any embankment widening;
e. benching and widening for guardrail; and
f. ditch cross sections.

15. Design Information. In addition to the plans, the designer should include the preliminary draft of the Design Summary. Unique special provisions should be initiated with this submission.

16. Certification. Provide an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification Form with this submission.

14-2.02(02) Information Meeting

A Public Information Meeting will be held as soon as practical after the field check, and allowing time for review of traffic maintenance plans. If all affected local public agencies were not represented at the field check, the designer should meet with those who did not attend to describe the project and proposed traffic maintenance plan. The designer should prepare minutes of each of these meetings. If significant additional right of way is required, a Public Hearing will be required as noted in Section 14-2.01(04). A Public Information Meeting will be held if any ramp within the project limits will be closed for 7 days or longer. After a Public Information Meeting is held, the designer will be required to document the concerns raised by the public at

the meeting. If a meeting is required, review the following sheets and information for Quality Assurance and include them with this submission.

1. Maintenance of Traffic Plans. In preparation for Public Information Meetings, the designer may be asked to perform the following activities.

    a. Displays. Prepare displays that can be used in coordination meetings or Public Information Meetings. This will include, but not necessarily be limited to, sketches of the typical cross section for each phase of the construction and composite drawings showing all ramp closures with traffic flow arrows indicating the number of lanes open during each construction phase.

    b. Transportation Management Plans. Address the requirements of any transportation management plans (TMP) that have been developed for the project.

    c. Queues. Analyze the capacity constraints due to lane closures, including anticipated queue and user costs. This can be done using the QUEWZ software discussed in Chapter Eighty-one.

2. Plan Sheets. These plans should be close to their final form. All revisions from previous submittals should have been incorporated into the plans. The construction plan sheets for this submittal should be legible and consistent with the quality desired for public viewing and reproduction for right-of-way plans. The designer should review the *INDOT Typical Plan Sheets* document to determine what information should be included on each sheet. This submittal should include the following.

    a. Title Sheet. Include the written description of the project work type and location and other pertinent data on the Title Sheet and finalize all previous information. However, note that the signature blocks will still be incomplete. If necessary, finalize the Title Sheet for right-of-way plans.

    b. Index and General Notes Sheet. The information on this sheet should be essentially complete. However, the sheet numbering on the index may change.

    c. Typical Sections. Typical sections should include all necessary details and be finalized.

    d. Plan and Profile Sheets. Include all necessary information on the plan and profile sheets. Right-of-way should be consistent with the details.

    e. Details. All necessary information should be presented. However, changes may be made at a later date.

f. Interchanges. Projects with interchanges should include the layout of the interchange including ramp gradients, horizontal alignment, vertical alignment, etc.

g. Traffic Maintenance Details. The proposed traffic maintenance scheme and phasing should be outlined including traffic crossovers, ramp closures, number of through lanes, etc.

h. Tables. Approach and Structure Data Tables can be preliminary but should be neat and legible.

i. Cross Sections. Cross sections are generally not included with the Information Meeting Plans. However, one set should be made available for public viewing.

j. Design Information. In addition to the construction plans, this submittal should include an updated cost estimate for the project and a copy of the draft Design Summary. The Department's cost estimating procedures should be used for the preliminary construction cost estimate; see Chapter Twenty. Quantities will generally consist only of major items with a percentage added to cover smaller items. If practical, the traffic-related items should be segregated.

3. Design Summary. For road rehabilitation projects which require Public Information Meetings, provide a draft copy of the Design Summary at the time the meeting is scheduled, even if the project has not yet reached the design approval stage.

The Design Summary format for road rehabilitation projects should be as follows.

a. Title Block. Use the guidelines for full Design Summaries presented in Chapter Seven.

b. Location and Project Description. Describe the location of the project by giving the beginning and ending points in kilometers from a State route. Identify the project length and the county. Briefly describe the type of pavement rehabilitation treatment that is being specified. Do not discuss the bridge rehabilitation work, because it is covered by the Bridge Inspection Report. It is also unnecessary to address any signing or lighting requirements.

c. Maintenance of Traffic During Construction. Indicate whether the mainline traffic will be maintained by crossovers or lane closures. Discuss any ramp closures that will occur. Address situations where staging of ramp closures may be required so that adjacent interchanges are not closed simultaneously. Include

the approximate duration of each ramp closure and give the proposed marked detour route. Describe any improvements that will be made to local roads or streets that will be used as a marked or unmarked detour. Determine if a formal agreement with the local government agency will be required.

If the project is located near a large urban or other heavily congested area, discuss any capacity constraints due to lane closures. Include the anticipated delays to the motoring public during peak traffic periods. Give the approximate length of the queue and discuss user costs. Indicate whether a transportation management plan (TMP) was utilized in developing the traffic control plan (TCP) for the project. Discuss whether A plus B bidding would be beneficial.

The items discussed above are generally not required on most rural road rehabilitation projects, unless ramp closures or long delays are anticipated.

d. Resolution of Field Check Items or Scope Changes. Discuss any items which may have been left unresolved in the field check minutes or attach memorandums which may indicate how field check issues were resolved. Provide brief written documentation of any changes from the original project scope.

e. Design Exceptions. If applicable, list any critical design elements for which a design exception was obtained. Also include the date of the design exception.

f. Attachments. The Design Summary should include any field check minutes, the pavement design letter and the cost estimate.

14-2.02(03) Final Design Summary Submission

The request for final pavement design must be submitted to the Materials and Tests Division prior to this stage if the desired pavement treatment is different than that noted in the Engineer's report. For this submission, include and review for Quality Assurance the following:

1. any revisions to the plans resulting from the Public Information Meeting;

2. environmental requirements satisfied by either of the following:

   a. The Environmental Impact Statement is complete and the Record of Decision (ROD) has been issued;

b. The Environmental Assessment is complete and a Finding Of No Significant Impact (FONSI) is made by the Federal Highway Administration; or

c. The Categorical Exclusion is complete. If there is a line on which the Federal Highway Administration is to sign, it must be signed;

3. the final Design Summary, with all required attachments;

4. necessary permit information, including Rule 5 as required; and

5. an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification Form.

14-2.02(04) Final Field Check Plans Submission

If a final field check is required, see the requirements listed in Section 14-2.01(07).

14-2.02(05) Final Check Prints Submission

The purpose of this submittal is to ensure the plans are complete and meet the criteria presented in the Engineer's Report and the Design Summary. The following should be completed and reviewed for Quality Assurance.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and note approval dates for any design exceptions.

3. Plan Sheets. The plans should be nearly complete. Changes from the Design Hearing, soils recommendations and pavement design recommendations should be incorporated onto the plans. Legends on sheets should be completed and checked for accuracy and consistency with Section 14-3.04. In addition, the designer should consider the following for the plan sheets.

   a. Title Sheet. Complete the Design Data Block and include the ESALs for the pavement design.

b. Index and General Notes Sheet. Check the general notes to ensure they are up-to-date and accurate. Revise the index as necessary.

c. Plan and Profile Sheets. Ensure that structure notations are completed; sodding, riprap and paved sodded ditch locations are indicated; earthwork balances are shown; and removal items are noted.

d. Detail Sheets. Ensure all details are completed and included with this submission. This includes details for temporary erosion control, traffic maintenance details, and traffic design elements (e.g., intersections, signals, signing and lighting).

e. Tables. Complete all data tables including the following:

(1) structure data table,
(2) approach table,
(3) underdrain table,
(4) paved side ditch and sodding table,
(5) guardrail table, and
(6) sign summary table.

f. Cross Sections. Design information on cross sections should be essentially complete. This includes final structure notations, earthwork areas and volumes, and benching areas and volumes.

4. Computations and Miscellaneous Documents. Include the following computations, quantities and other documents with this submission.

a. final drainage design;
b. structure quantities;
c. underdrain quantities;
d. sodding, riprap and paved sodded ditch quantities;
e. preliminary earthwork quantities;
f. paving quantities for the approach table;
g. signing, traffic signals, illumination and pavement marking quantities; and
h. preliminary special provisions.

5. Pavement Design. Incorporate final pavement design into the typical cross sections and quantities.

6. Quantities. Finalize all quantities and include a bound copy.

7. Cost Estimate. Conduct a detailed review to ensure that all necessary items have been included. Finalize the construction cost estimate using Estimator.

8. Certification Form. Include a copy of the Scope/Environmental Compliance Certification/ Permit Application Certification Form.

9. Special Provisions. Complete the special provisions including special provisions for non-standard items.

10. Erosion Control Plans. Include the completed set of erosion control plans.

11. Rule Five. If required, complete the Rule Five Submission as described in Chapter Thirty-seven.

14-2.02(06) Final Tracings Submission

Complete the following and review these instructions for Quality Assurance.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Identification Numbers. Ensure that the proper contract, project, and sheet numbers are included on all sheets.

3. Signatures. Have the appropriate individuals complete the signature blocks on the appropriate sheets.

4. Submittal. Review the procedures in Section 14-1.02(03) for guidance on submitting the final tracings to the Project Coordinator and Records Unit.

14-2.03 Bridge Plans (New Bridge Construction/Bridge Replacement)

14-2.03(01) Hydraulics Review Submission

A submittal for hydraulics review will be required prior to or concurrent with the Grade Review and Structure Type and Size Selection submittal. When preparing this submission, consider the following:

1. All preliminary plotting should be completed and checked.

2. On projects which are over waterways involving bridge replacements, small structure replacements, and bridges on new alignment, provide a Layout Sheet with the contours plotted on the plan view and cross sections of the T-line.

3. For crossings with road overflow, include the Road Plan and Profile Sheets so that the road profile can be determined.

4. For larger waterway crossings, include a Detail Sheet of the plan view with the contours plotted to the survey limits. This information will be used by the Department for the hydraulic analysis.

5. If the project is a Local Public Agency project, include the hydraulic analysis computations and recommendations for review.

6. The plan sheets will be for information purposes only except for the Layout Sheet which will include the preliminary structure geometrics.

14-2.03(02) Grade Review and Structure Type and Size Selection Submission

Place the proposed design information for this submittal on CADD. However, the plans need not be in final form. The designer is encouraged to add notes on the plans explaining special situations or items which are not readily apparent which may influence the proposed design. These notes should be removed for later submissions. The following sheets and information must be reviewed for Quality Assurance and included with this submission.

1. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and note approval dates of any design exceptions. Also note any discrepancies from the Level Two design criteria listed in Section 40-8.02(02).

2. Computations. Include the computations as follows:

    a. design computations for determining the structure size and geometrics; and

    b. project length computations including guardrail lengths and other contributing factors.

3. Economic Analysis. Include a copy of any structural economic analysis that may have been conducted to determine the most economic structural alternative.

4. Index and Title Sheet. At this project stage, the Index and Title Sheet should include the information as follows:

   a. project numbers;

   b. description (des) number;

   c. bridge file number;

   d. county location map;

   e. project location map including north arrow and scales;

   f. description of the project work type and location;

   g. design data including design speed, project design criteria, functional classification, terrain and traffic data;

   h. applicable reference point (does not apply to local agency projects);

   i. signature block(s); note that these blocks will not be completed at this stage; and

   j. an index of plan sheets at this stage. Note that sheet numbers will change for future submittals.

5. Typical Cross Sections. Typical cross sections for this submittal should only show basic configuration and design features. This will typically include the following:

   a. lane and shoulder widths;

   b. profile grade, construction centerline, paper relocation line and survey line locations; and

   c. basic design features including curbs, sidewalks, pavement and shoulder cross slopes, side slopes, ditches, etc.

6. Road Plan and Profile Sheets. At this project stage, the Road Plan and Profile Sheets will generally only include the preliminary design information. Some of the details that should be addressed include the following:

a. plotting of existing topography should be complete;

b. beginning and end of project;

c. horizontal alignment (e.g., horizontal curve data, PC, PI, PT, bearings);

d. vertical alignment and its relationship to grade controlling features;

e. preliminary drainage design including culverts and ditch grades;

f. preliminary public road approach and drive locations;

g. construction limits; and

h. proposed guardrail limits.

7. Layout Sheet. The Layout Sheet should include the preliminary design information for the following:

a. existing ground contours;

b. horizontal alignment;

c. vertical alignment;

d. drainage structures;

e. public road approach and drive locations;

f. approximate construction limits;

g. plan view showing bridge centerline station and skew;

h. proposed structure geometrics (span lengths and clear roadway widths in the Title Block);

i. channel protection;

j. utility owners;

k. existing structure data; and

l. hydraulic data.

8. Channel Change Layout Sheet. Include this sheet when the extent of the channel change goes beyond the general layout. The Channel Change Layout Sheet should include the preliminary design information for the following:

   a. stream profile;
   b. new channel geometrics;
   c. channel typical cross section; and
   d. slope protection.

9. Cross Sections. The preliminary cross sections should include the following:

   a. templates of the typical sections placed on the existing cross sections;
   b. profile grade elevations; and
   c. drainage structures.

10. Certification. Provide an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification Form with this submission.

14-2.03(03) Preliminary Field Check Plans

Plans should be approximately 40% complete at this stage. The following sheets and information must be reviewed for Quality Assurance and included with this submission.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Conformance. Review the plans, including the temporary runaround and other traffic maintenance plans excluding detours for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and note any apparent or possible design exceptions. Also note any discrepancies from the Level Two design criteria listed in Section 40-8.02(02). Submit the required documentation for all Level One and Level Two design exceptions.

3. Plat Sheet. Include a preliminary Plat No. 1 (does not apply to local agency projects).

4. Road Plan and Profile Sheets. In addition to the information in Section 14-2.03(02), show the following:

a. elevations and grades of ditches so that accurate right-of-way requirements can be determined;

b. construction limits;

c. proposed right-of-way including temporary right-of-way;

d. public road approach and drive locations;

e. drainage features (e.g., storm sewers, pipe structures, ditch grades); and

f. permanent erosion protection, including paved side ditches, riprap or sodding limits.

5. Detail Sheets. Include the preliminary layouts for the details as follows:

a. roadway and shoulder layout for guardrail;

b. special elements, where applicable (e.g., modified approaches, signs, signals);

c. intersection layout details including right- and left-turn lanes with the turning movements indicated; and

d. superelevation transition diagrams.

6. Traffic Maintenance Details. The proposed traffic maintenance scheme and phasing should be outlined.

7. General Plan Sheet. The General Plan Sheet should include the information as follows:

a. plan view;
b. elevation view;
c. typical bridge cross section;
d. design data; and
e. suggested substructure type.

8. Road Summary Sheet. The preliminary Road Summary Sheet should include the following:

a. approach table with type, location and geometric data included and type of materials noted; and

b. structure data table with location, size and type noted.

9. Cross Sections. See information for cross sections in Section 14-2.03(02). Finalize the cross sections according to the revisions from the Grade Review plans. Also show the public road approaches and drives.

10. Design Information. In addition to the plans, the designer should include the preliminary draft of the Design Summary, the draft Fish and Wildlife Review and a request for preliminary woody revegetation determination, if applicable.

14-2.03(04) Design Hearing Plans and Preliminary Right-of-Way Plans Submission

Plans for this submittal should be close to their final form. The construction plan sheets for this submittal should be legible and consistent with the quality desired for public viewing. The right-of-way plans should be consistent with the requirements of Chapter Eighty-five. The designer should review the *INDOT Typical Plan Sheets* document to determine what information should be included on each sheet. The following sheets and information must be reviewed for Quality Assurance and included with this submission.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Index and Title Sheet. Finalize the Title Sheet for right-of-way plans and include the right-of-way index.

3. Plat Sheets. Finalize all plat sheets, if required.

4. Road Plan and Profile Sheets. Finalize the right-of-way.

5. Layout Sheet. The Layout Sheet should be essentially complete.

6. General Plan Sheet. The General Plan Sheet should be essentially complete.

7. Design Information. In addition to the construction plans, this submittal should include an updated cost estimate for the project and a copy of the draft Design Summary. The Department's cost estimating procedures should be used for the preliminary construction cost estimate; see Chapter Twenty. Quantities will generally consist only of major items with a percentage added to cover smaller items. If practical, the traffic-related items should be segregated.

8. Certification. Provide an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification Form with this submission.

14-2.03(05) Right-of-Way Plans Submission

Chapter Eighty-five presents the criteria and information that should be included with a set of right-of-way plans. This submission is not required for local agency projects. In addition to completing the following, the designer should review these instructions for Quality Assurance.

1. Include the marked-up preliminary right-of-way plans with this submission, if required to do so.

2. Incorporate all revisions made during the Preliminary Right-of-Way Plans Submission review.

3. Complete all sheet cross references.

4. Complete all project information boxes in the right-of-way plans, including right-of-way project number and sheet numbers.

5. Complete the checklist shown in Figure 85-2F.

14-2.03(06) Preliminary Plans for Final Approval Submission

Submit a request for the final pavement design to the Materials and Tests Division at this time. Include the and review these elements for Quality Assurance as follows

1. plan revisions resulting from the Design Hearing comments;

2. any revisions to the plans due to the Geotechnical Report recommendations;

3. Soil Borings Sheets (prepared by the Materials and Tests Division for in-house projects or by the consultant for consultant-designed projects);

4. Foundation Review Form;

5. a final Design Summary including resolution of hearing comments;

6. environmental requirements satisfied by either of the following:

    a. The Environmental Impact Statement is complete and the Record of Decision (ROD) has been issued;

    b. The Environmental Assessment is complete and a Finding Of No Significant Impact (FONSI) is made by the Federal Highway Administration; or

    c. The Categorical Exclusion is complete. If there is a line on which the Federal Highway Administration is to sign, it must be signed;

7. permit information as required; and

8. updated Scope/Environmental Compliance Certification/Permit Application Certification Form.

14-2.03(07) Final Check Prints Submission

For this submittal, finalize the plans and include all roadway, traffic and bridge details and check the computations. Complete the following and review these elements for Quality Assurance.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and note approval dates of any design exceptions.

3. Pavement Design. Incorporate the final pavement design into the typical cross section and final quantities.

4. Computations and Quantities. Include the computations and quantities with this submission as follows:

    a. final approach drainage design;
    b. superstructure design;
    c. end bent or abutment design;
    d. interior substructure design;
    e. bridge seat elevations;
    f. screeds (at copings, profile grade, each beam line and each construction joint);

g. superstructure quantities;
h. end bent or abutment quantities;
i. interior substructure quantities;
j. pavement, curb, sidewalk and related quantities;
k. drainage structure quantities;
l. riprap, sodding and seeding quantities;
m. earthwork quantities;
n. traffic-related items and designs as discussed and revised from Field Check Plans;
o. traffic maintenance quantities;
p. miscellaneous roadway quantities;
q. updated construction cost estimate; and
r. completed special provisions.

5. Reports. Ensure that the recommendations from the Geotechnical Report and other reports regarding peat, hazardous waste, special wastes, etc. have been incorporated into the plans, specifications and cost estimate.

6. Plans. The plans should be nearly complete at this project stage and should include the following.

a. Title Sheet. Complete the Design Data Block and include the ESALs for the pavement design. Also update the index as necessary.

b. Typical Cross Sections. Add the final pavement design information to the Typical Cross Sections.

c. Plan and Profile Sheets. Ensure that structure notations are completed; sodding, riprap and paved sodded ditch locations are indicated; earthwork balances are shown; and removal items noted.

d. Detail Sheets. Ensure all details are completed and included with this submission. This includes details for the following:

(1) reinforced concrete bridge approach bill of materials and/or details;
(2) temporary erosion control;
(3) traffic maintenance details; and
(4) traffic designs elements (e.g., intersections, signals, signing and lighting).

e. Bridge Sheets. Finalize the design for the bridge sheets as follows.

(1) Soil Boring Sheet. Ensure the information is accurate from the Geotechnical Report.

(2) Layout Sheet. Ensure the riprap and slope wall quantities are noted and the earthwork summary is completed.

(3) General Plan Sheet.

(4) End Bent and/or Abutment Details.

(5) Interior Substructure Details.

(6) Superstructure Details.

f. Tables. Complete all data tables including the following:

(1) bridge summary table;
(2) structure data table;
(3) approach table;
(4) underdrain table;
(5) paved side ditch and sodding table;
(6) guardrail table; and
(7) sign summary table.

g. Cross Sections. Design information on cross sections should be essentially complete. This includes final structure notations, earthwork areas and volumes, and benching areas and volumes.

7. Certification Forms. Include a copy of the Scope/Environmental Compliance Certification/Permit Application Certification Form.

8. Rule Five Submission. If required and not previously submitted, submit in accordance with Section 9-1.02.

14-2.03(08) Final Tracings Submission

Complete the following and review these instructions for Quality Assurance.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Sheet Number. Ensure that the proper sheet and project numbers are included on all sheets.

3. Signatures. Have the appropriate individuals complete the signature blocks on the appropriate sheets.

4. Submittal. Review the procedures in Section 14-1.02(03) for guidance on submitting the final tracings to the Project Coordinator and Records Unit.

14-2.04 Bridge Rehabilitation Projects

14-2.04(01) Preliminary Field Check and Inspection Report

Based on the initial inspection of the structure, prepare the Inspection Report. The Report should include but not be limited to the following:

1. existing condition status;
2. rehabilitation recommendations;
3. a tabulation of design criteria;
4. a cost estimate;
5. quantity computations;
6. color photographs; and
7. environmental permit requirements.

The Report may also include a detailed account of past repairs, a design exception request, and justification for a consultant survey to verify geometric information.

Section 72-2.05 presents the Department's procedures for the initial Field Inspection and the suggested format and content of the Bridge Inspection Report.

Note: If potential scour problems were noted on the initial inspection, the Hydraulics Unit should be contacted.

14-2.04(02) Design Approval of Report

Once the Inspection Report has been determined by the reviewer to be satisfactory, then Design Approval of the Report is recommended. The designer will be requested to make a Preliminary Plans Submission upon Design Approval of the Report.

14-2.04(03) Preliminary Plans Submission

After receiving Design Approval, begin preparation of the preliminary plans. Information on these plans will include the following.

1. Index and Title Sheet. At this project stage, the Index and Title Sheet should include the information as follows:

    a. project numbers, bridge file number and designation number;

    b. project description;

    c. county location map;

    d. project layout map including north arrow and scale;

    e. design data including design speed, project design criteria, functional classification (rural or urban setting), type of terrain and traffic data;

    f. signature block(s); note that these blocks will not be completed at this stage; and

    g. an index of plan sheets at this stage. Note that sheet numbers may change for future submittals.

2. Maintenance of Traffic Details. The proposed traffic maintenance scheme and phasing should be outlined.

3. Layout. A Layout Sheet is generally not required unless the rehabilitation project is significant enough to warrant a full survey.

4. General Plan. The General Plan Sheet should include the following:

    a. plan view;
    b. elevation view;
    c. typical bridge cross section;
    d. design data relative to structural elements;
    e. related general notes; and,
    f. general rehabilitation recommendations (e.g., legend, material notes).

Preliminary plans will be sent to the Railroads Unit and the Utilities Unit for their use. Preliminary Plans may be utilized in the application of any relevant environmental permits. Upon approval of the Preliminary Plans, the designer will be requested to submit the Final Plans.

14-2.04(04) Final Plans Submission

This submittal will include the following:

1. any revisions to the Preliminary Plans;
2. all necessary plan details required to adequately define the required repairs;
3. final quantity computations;
4. final design computations;
5. special provisions; and
6. final construction cost estimate.

The Final Plans should also include any specific measures proposed by the Railroads Unit, the Utilities Unit or the Hydraulics Unit.

14-2.04(05) Final Field Check

After reviewing the Final Plans and finding them substantially complete and correct, the Bridge Rehabilitation Unit will schedule a Final Field Check. The purpose of this Field Check will be as follows:

1. confirm the condition of the structure and appropriateness of the plans; and

2. allow the District representative to review the traffic maintenance scheme and construction procedures.

14-2.04(06) Tracings Submission

Any revisions resulting from the Final Field Check and Final Plans review will be completed for this submission.

14-2.05 Signing Plans

Separate signing plan sheets, including Title Sheet, Index and General Notes Sheet, etc., are provided for road projects where a separate designation number is used for the signing portion of the project. This typically occurs where the project is 1.5 km or longer or for major projects (e.g., interchanges).

14-2.05(01) Preliminary Plans

Preliminary signing plans will consist of plan sheets with the information as follows:

1. mainline geometry and all intersecting roadways;
2. North arrow on each sheet; and
3. mainline and all intersecting roadways labeled, and centerline stationing.

14-2.05(02) Preliminary Field Check Plans Submission

For the Preliminary Field Check submittal, the signing plans should include the sheets as follows.

1. Title Sheet. Include the layout map and note the project location on the location map.

2. Index and General Notes Sheet. The index blocks should be completed to indicate the sheet numbers for the plans at this stage. Note that the sheet numbers will change for future submittals.

3. Signing Plan Sheets. These sheets should include the information as follows:

    a. plan view of the roadway;

    b. route and street names;

    c. right-of-way limits;

    d. North arrow;

    e. stationing, identification number and message of all existing sheet signs, ground-mounted panel signs and overhead panel signs;

f. stationing and identification number of all proposed signs;

g. proposed panel sign messages; and

h. the applicable legend; see Section 14-3.04.

4. Sign Summary Table. The sign location (station) and type (sign code) should be noted on the sheets. However, the sign size, summary and post size do not need to be completed at this project stage.

14-2.05(03) Final Field Check Plans Submission

For the Final Field Check submittal, the signing plans should be in their final form. However, some changes still may occur. Signing plans at the Final Field Check submission will include the following.

1. Title Sheet. The Title Sheet should be essentially complete except for signatures.

2. Index and General Notes Sheet. This sheet should include a list of all utilities and a complete list of general notes.

3. Existing Signing Plan Sheets. These sheets will provide the stationing, identification number and message of the existing signs.

4. Proposed Signing Plan Sheets. In addition to the criteria for Preliminary Field Check plan sheets, these sheets should include the information for overhead sign lighting as follows:

   a. service point;
   b. cable duct;
   c. cable duct marker; and
   d. handhole.

5. Sign Layout Sheets. Panel sign layout sheets should include the following:

   a. size of sign;
   b. sign border;
   c. corner radii;
   d. height of message or legend;

e. stationing and identification number;
f. code for route shield;
h. size of arrow and degree of slant; and
g. notation for special color combinations (e.g., black copy on yellow background).

6. Cross Section Sheet. The sign cross section sheets should include the following:

a. for box truss, monotube span, tri-cord and cable span structures, the full roadway cross sections;

b. for cantilever structures, half cross sections from the lane lines for multilane facilities or the centerline for 2-lane facilities to the front slope;

c. for ground-mounted panel signs,the cross sections from the edge of the traveled way to the right-of-way line;

d. Cross section sheets for ground-mounted panel signs will include the following:

(1) size of sign;
(2) sign message;
(3) size and length of posts;
(4) horizontal clearance from the edge of traveled way;
(5) vertical clearance from the edge of traveled way or ground line;
(6) footing dimensions;
(7) identification number; and
(8) stationing.

e. Cross section sheets for overhead signs structures will include the following:

(1) size of sign;
(2) legend;
(3) luminaire and spacing, if required;
(4) structure dimensions;
(5) identification number;
(6) stationing; and
(7) type of roadside protection.

7. Details. The signing detail sheets to be included are as follows:

a. completed Sign Summary Table;
b. proposed route markers assembly details;
c. sheet sign details;

d. traffic sign details;
e. foundation details; and
f. any special design details.

8. Other Documents. Other documents that should be included with this submission may include structure and foundation calculations, special provisions and cost estimates.

14-2.05(04) Final Check Prints Submission

The purpose of this submittal is to ensure the plans are complete. Those items which were revised at the Final Field Check should have been addressed. All quantities should be finalized and a bound copy included with the submittal. Conduct a detailed review to ensure that all necessary pay items have been included and that special provisions are provided for all non-standard items. A finalized cost estimate should also be included.

14-2.05(05) Final Tracings Submission

The final plan submittal will include any necessary revisions from the Final Check Print submittal. Section 14-1.02(03) discusses what is required for the Final Tracings Submission.

14-2.06 Signal Plans

14-2.06(01) Preliminary Plans

Preliminary signal plans will consist of plan sheets with the information as follows:

1. mainline geometry and all intersecting roadways;
2. North arrow on each sheet;
3. outline of signalized intersections; and
4. centerline stationing.

14-2.06(02) Preliminary Field Check Plans Submission

For the Preliminary Field Check submittal, the signal plans should include the following.

1. Title Sheet. Include the layout map and note the project location on the location map.

2. Index and General Notes Sheet. The index block should be completed to indicate the sheet numbers for the plans at this stage. Note that the sheet numbers will change for future submittals.

3. Signal Plan Sheets. These sheets should include the nformation as follows:

    a. plan view of the intersection including intersection geometrics, curbs, shoulders and building lines;

    b. route and street names;

    c. right-of-way limits;

    d. North arrow;

    e. commission number for signal, State highway only;

    f. all existing features (e.g., controller cabinets, signal poles, mast arms, foundations, sidewalks, curbs, pavement markings, utilities);

    g. proposed signal installations (e.g., type of signal supports, location of controller cabinet, pavement markings, lane restrictions, intersection dimensions, roadway width, position and direction of signal heads, phase diagram, detector locations, conduit locations, the number of wires in each cable run, power service location, detector housing, hand holes, disconnect hangers);

    h. other applicable information that should be noted includes the location of any pertinent signs, panel sign messages, approaches near the intersection, bus stops and loading zones, drainage structures, curb ramps and utilities;

    i. the applicable legend; see Section 14-3.04; and

    j. posted speed limit.

14-2.06(03) Final Field Check Plans Submission

For the Final Field Check submittal, the signal plans should be in their final form. However, some changes still may occur. Signal plans at the Final Field Check submission will include the following.

1. Title Sheet. This sheet should be essentially complete except for signatures.

2. Index and General Notes Sheet. This sheet should include a list of all utilities and a complete list of general notes.

3. Signal Plan Sheets. Include all revisions from the Preliminary Field Check and finalize the Sheets.

4. Signal Details Sheets. All necessary signal detail sheets should be included with this submission.

14-2.06(04) Final Check Prints Submission

The purpose of this submittal is to ensure the plans are complete. Those items which were revised at the Final Field Check should have been included. All quantities should be finalized on the Table of Quantities Sheet and a bound copy included with the submittal. Conduct a detailed review to ensure that all of the necessary pay items have been included and that special provisions are provided for all non-standard items. A finalized cost estimate should also be included.

14-2.06(05) Final Tracings Submission

The final plan submittal will include any necessary revisions from the Final Check Print submittal. Section 14-1.02(03) discusses what is required for the Final Tracings Submission.

14-2.07 Lighting Plans

The lighting portion of all projects should be submitted as a separate set of plans, including the Title Sheet, Index and General Notes Sheet, etc.

14-2.07(01) Preliminary Plans

Preliminary lighting plans will consist of plan sheets with the information as follows:

1. mainline geometry and all intersecting roadways;
2. North arrow on each sheet;
3. mainline and all intersecting roadways labeled; and
4. centerline stationing.

14-2.07(02) Preliminary Field Check Plans Submission

For the Preliminary Field Check submittal, the lighting plans should include the following.

1. Title Sheet. Include the layout map and note the project location on the location map.

2. Index and General Notes Sheet. This sheet should include a list of all utilities, a complete list of general notes and all applicable *INDOT Standard Drawings* noted. The index block should be completed to indicate the sheet numbers for the plans at this stage. Note that the sheet numbers will change for future submittals.

3. Lighting Plan Sheets. These sheets should include the information as follows:

    a. plan view of the roadway;
    b. route and street names;
    c. right-of-way limits;
    d. North arrow;
    e. stationing and identification number of proposed light standards;
    f. identification of overhead sign lighting, if required;
    g. applicable legend; see Section 14-3.04; and
    h. service point location and type.

4. Design Data. The following design data to be included with the Preliminary Field Check Plans is as follows:

    a. initial lamp lumens;
    b. average maintained illumination;
    c. lamp lumen depreciation factor;
    d. luminaire dirt depreciation factor;
    e. uniformity ratio;
    f. mounting height;

g. luminaire classification; and
h. pavement classification.

14-2.07(03) Final Field Check Plans Submission

For the Final Field Check submittal, the lighting plans should be in final form. However, some changes still may occur. Lighting plans for the Final Field Check submission will include the following.

1. Title Sheet. This sheet should be essentially complete except for signatures.

2. Index and General Notes Sheet. This sheet should include a list of all utilities and a complete list of general notes. The index block should be completed to indicate the sheet numbers for the plans at this stage.

3. Lighting Plan Sheets. In addition to the criteria for Preliminary Field Check plan sheets, these sheets should include the following:

   a. cable duct;
   b. circuit number;
   c. cable duct marker, if required;
   d. handhole, if required; and
   e. main breaker and circuit breaker rating.

4. Summary Table. The Summary Table should include the following:

   a. luminaire or tower number;
   b. connection type;
   c. circuit connection;
   d. pole set-back distance from edge of traveled way, taper or ramp;
   e. mast-arm length (conventional lighting);
   f. luminaire effective mounting height (E.M.H.); and
   g. top foundation elevation with respect to the edge of traveled way.

5. High-Mast Tower Plans. High-mast tower plans should include the details as follows:

   a. pole data schedule;
   b. highway illumination tower detail;
   c. high-mast tower miscellaneous details;
   d. external winch concrete pad;

e. lightning rod typical sheet; and
f. tower retrofit details, if required.

6. Other Documents. Other documents that should be included with this submission may include the following:

a. voltage drop and breaker rating calculations;
b. design calculations;
c. special provisions; and
d. cost estimates.

14-2.07(04) Final Check Prints Submission

The purpose of this submittal is to ensure the plans are complete. Those items which were revised at the Final Field Check should have been included. All quantities should be finalized and a bound copy included with the submittal. Conduct a detailed review to ensure that all of the necessary pay items have been included and that special provisions are provided for all non-standard items. A finalized cost estimate should also be included.

14-2.07(05) Final Tracings Submission

The final plan submittal will include any necessary revisions from the Final Check Print submittal. Section 14-1.02(03) discusses what is required for the Final Tracings Submission.

14-2.08 Partial 3R Project Plan Development

14-2.08(01) Preliminary Plans

1. Title Sheet. The title sheet is the first page and should contain the information as follows:

a. contract and description code numbers;
b. traffic data;
c. design data as follows:

(1) design speed;

(2) project design criteria: Partial 3R (non-freeway);
(3) functional classification;
(4) rural or urban setting;
(5) terrain; and
(6) access control;

d. project description information as follows:

(1) route number;
(2) county names and congressional township, range, and section;
(3) limits described from Department-maintained route intersections and by Reference Post system; and
(4) length (gross and net);

e. location map, including information as follows:

(1) civil boundaries;
(2) county, township lines, corporate limits;
(3) nearby Department-maintained routes and major local roads;
(4) north arrow; and
(5) project limits, with stations and highlighted graphics;

f. paving exceptions, with stations;
g. station equations;
h. current standards specifications effective year;
i. certification block; and
j. state location map.

2. Construction Plans Index. The Construction Plans Index is a tabulation and description of the numbered design drawings to be included in the plans document.

3. Strip Map. The strip map is usually a line drawing showing the following:

a. Route number;
b. Beginning and ending stations and reference posts and station equations. Consistent units should be used throughout the plans;
c. Stations and reference posts for intersecting streets, county roads, city or town limits, and intersecting county lines and railroad crossings, bridges, and paving exceptions;
d. North arrow;
e. Location of all recommended construction signs;
f. Existing utility lines within construction limits; AND

g. Civil townships

4. Typical Cross Sections. The typical cross sections are composed of four basic parts as follows.

   a. Illustration.

      (1) Existing conditions and dimensions (i.e., pavement width, material type, thickness cross-slope, curb, shoulder, ditches, etc.); AND
      (2) Proposed construction and dimensions (i.e., HMA courses with binder grading, overlay cross-slope, widening, curb shoulders, ditches, etc.).

   b. Legend showing labels and corresponding items. The descriptions shown in the pay item names should be used when applicable.

   c. Title block.

      (1) Route number; and
      (2) Limits of section and exceptions.

   d. Supplemental information block (i.e., curve data for superelevation).

5. Typical Approach Details. The INDOT *Standard Drawings* should be used. Existing field conditions not in accordance with the details shown on the *Standard Drawings* will require details to be shown on the plans.

6. Miscellaneous Details. These include all other details not covered by the strip map, typical section or INDOT *Standard Drawings*.

7. Special Provisions. The designer should follow the guidelines for preparing special provisions described in Section 19-2.0. The designer should not specify the use of proprietary or experimental products or construction methods.

14-2.08(02) Assessing Preliminary Pavement Design

Once the project has been assessed to be a partial 3R project, the designer should determine an approximate pavement thickness for developing preliminary typical cross sections.

14-2.08(03) Preliminary Field Check

The preliminary field check should occur at some point before development of preliminary plans. The preliminary field check should be scheduled with the district sections involved with plan development. The arrangements for scheduling the preliminary field check should be made while plan development is still proceeding, if possible. Copies of preliminary plan documentation should be made available for review prior to the preliminary field check.

Persons who typically should attend the preliminary field check are as follows:

1. District Personnel.

    a. Head design engineer;
    b. Construction area engineer;
    c. Operations support field engineer;
    d. Subdistrict manager and/or unit foreman;
    e. Designer;
    f. Traffic engineer; and
    g. Utilities/railroads engineer.

2. Other Personnel.

    a. Local government agencies if applicable;
    b. Local utilities if applicable; and
    c. INDOT pavement design engineer, if AADT $\geq$ 5000 or $\geq$ 500 trucks

14-2.08(04) Right of Way

Right-of-way acquisition is not normally required for a partial 3R project. If it is required, the designer should return to the engineering assessment phase to consider the project as full 3R, 4R, or possibly new construction.

14-2.08(05) Public Hearing

Public involvement is not normally required for a partial 3R project. If it is, the designer should see Chapter Eight.

14-2.08(06) Utilities and Railroads

The portions of the project limits which may affect existing utilities should also be addressed early in the PPD phase. The designer should stay in close contact with the district utilities/railroads coordinator to ensure that existing utilities are relocated to avoid delays in the project development. To accomplish this, the district utilities/railroads coordinator should have final check prints as early as possible.

If railroad crossings are within the project limits, the district utilities/railroads coordinator should be advised. See Chapters Eleven and Forty-seven.

14-2.08(07) Calculations

The calculations must follow a systematic and logical methodology. All calculations should be reviewed for accuracy. Systematic calculations make review and verifying quantities considerably more efficient. All calculations should be submitted with the final documents and should remain the property of the Department.

14-2.08(08) Returned Correspondence

Once input from the district maintenance/operations, construction, and traffic sections has been received with suggested changes following the preliminary field check, it may be necessary to arrange and conduct a final field check. See Section 14-2.08(02) for the personnel list who should attend this field check.

14-2.08(09) Final Pavement Design

If the current AADT $\geq$5,000 or $\geq$500 trucks, a request for a final pavement design should be submitted to the Materials and Tests Division's pavement design engineer. If the AADT <5,000 or <500 trucks, the designer performs the final pavement design.

14-2.08(10) Final Check Prints

The final check prints should now be completed. These documents are outlined below.

1. Transmittal Letter. This document should include the following:

    a. Date;
    b. To, Thru, From personnel;
    c. Contract number;
    d. Route number;
    e. Counties;
    f. Des number;
    g. Project description and location;
    h. Estimated contract completion date or number of work days;
    i. Estimated costs; and
    j. Letting date.

2. Proposal Book Cover Sheet. This sheet should include the contract number and letting date.

3. Contract Information Book Cover Sheet. This sheet should include the following:

    a. Contract number;
    b. Letting date; and
    c. Certifications (approved signatures and stamps).

4. Contract Requirements Worksheet. The designer should place project identification information on this sheet, then transmit it to either the Contracts and Construction Division's Contracts Section or the district construction engineer. The Contracts Section will then transmit it to the district construction engineer. The district construction engineer will determine the other information as required, then return it to the designer. The identification information should be that as follows:

    a. Contract number;
    b. Letting date;
    c. District;
    d. Project number;
    e. Route number;
    f. Description, including work type;
    g. Location;
    h. Counties; and
    i. Effective dates of Supplemental Specifications and List of Approved Materials.

5. Table of Contents. This sheet should indicate the documents to be identified as follows:

    a. Contract number;

b. Official Detour Map;
c. Proposal;
d. Schedule of Pay Items;
e. Construction plans and number of pages; and
f. Special provisions.

6. Estimate of Quantities and Cost Estimate. All pay items, including undistributed items, should be referenced in the plans. All pay items are to be worded using the nomenclature shown in the INDOT *Standard Specifications* and authorized-estimating-software listing. The sequence, or order of the pay items, should be numerical by INDOT *Standard Specifications* reference number.

14-2.08(11) Review of Final Check Prints

After the designer has assembled the final check prints, a copy may be circulated among the other design engineers for review and comment. The final check prints are then forwarded to the district head design engineer for additional review and comments. Upon completion, the designer will make the appropriate revisions.

A copy of the final check prints is to be sent to the appropriate district program development, construction, maintenance/operations, or traffic section as required. They are expected to review and return the copy to the district development section within one to two weeks. A cover letter should be sent with the copy indicating what is expected and when it should be returned.

1. Program Development Review. A copy of the contract documents is supplied for their use in coordinating local agency agreements and detours, and updating the production schedule.

2. Construction Review. The area engineer should review the contract documents and indicate errors, inconsistencies, and constructability. The area engineer fills in the remaining information required on the Contract Requirements Worksheet such as the field office requirements or the need for a profilograph, and also establishes the earliest date to begin work and the contract completion time.

3. Maintenance/Operations Review. The maintenance/operations section reviews the contract documents and suggests additional changes or corrections. The areas of review usually pertain to small drainage structures/pipes, wedge and level, patching, guardrail, and ditch work.

4. Traffic Review. The traffic section reviews the contract documents and suggests additional changes or corrections pertaining to traffic maintenance and traffic safety. They also verify and coordinate the locations and impacts to signal loops, detector housings, no-passing zones, pavement markings, etc.

5. Discussion With Head Design Engineer. After the other sections have reviewed the contract documents and have offered suggested changes, the designer is to meet with the head design engineer to discuss the changes and suggestions. The head design engineer will then decide which corrections are to be made. The designer will then make the appropriate changes.

6. Development Engineer Review. After all changes are made, a copy of the contract documents is sent to the district development engineer for final review. The development engineer may suggest more changes.

7. Materials Engineer Review. The materials engineer may suggest changes to the Plant Laboratory recurring special provision.

14-2.08(12) Shelf-Ready Project

The final check prints are considered shelf-ready after they have been reviewed by the development engineer. The documents, now final plans, are to be kept on file until funds are appropriated and a letting date has been established.

14-2.08(13) Signatures and Stamps

Once funds are appropriated and a letting date has been established, the final plans should be reviewed and updated. The final plans should then be stamped and/or signed by the appropriate individuals as shown in Section 14-1.02(03).

14-2.08(14) Contract Documents Package

Upon receipt of the approved final plans by the development engineer, they are ready to be transmitted as contract documents to the Contracts and Construction Division's Contracts Section for processing. The package should consist of the following.

1. Plans.

a. 8½" x 11" Plan Sheets Format. The original construction plans and cross-sections with one photocopied set should be transmitted. If the cross-sections are in the 24" x 36" format, the only the originals of the cross sections should be sent.

b. 24" x 36" Plan Sheets Format. The original construction plans and cross-sections and two sets of prints of the construction plans without cross-sections prints should be transmitted.

2. Estimate of Quantities and Cost Estimate. The estimate of quantities and cost estimate should be generated using the authorized estimating software. The transmittal shall consist of a floppy diskette and one hard copy of both the estimate of quantities and cost estimate.

3. Special Provisions. One hardcopy of the prepared Special Provisions Menu with completed recurring special provisions and unique special provisions should be transmitted. A floppy diskette containing the unique special provisions shall be provided.

4. Detour Maps. The Official Detour Map and Unofficial Local Detour Map, if required, with the approved unofficial local detour documents should be transmitted.

The approved package should be sent to the Contracts and Construction Division's Contracts Section where the documents will be processed and prepared for letting. This step should be completed at least 14 weeks prior to the contract letting date.

14-2.08(15) Review Process

1. Pre-Letting. The Contracts and Construction Division may require additional information or further corrections to be made in order for the contract documents to be properly processed. The designer should promptly address these concerns. All responses from the designer should be directed to the district construction engineer.

2. Post-Letting. Following the contract award, a preconstruction conference will be held. The designer should be available upon request to answer any questions.

14-3.0 DRAFTING GUIDELINES

14-3.01 Drafting Methods

All project drafting will typically be performed using CADD. Section 14-4.0 and the *INDOT CADD System User Guide* provide information on the Department's CADD system. For those consultants not using INDOT's CADD system, Chapter Sixteen provides the Department's criteria for translating these CADD files to the Department's system.

The Department's preferred practice is to only use CADD drafting; however, for small in-house and consultant-designed projects, manual drafting may be acceptable. For manually drafted projects, the designer/drafter should still use the criteria presented in Chapter Fifteen and the *INDOT CADD System User Guide* for line weights, topography symbols, plotting accuracy, etc.

In general, where manual plotting is used, the drafter must consider line weights and text sizes to ensure that, when the plans are reduced, they will be readable. The minimum text should be at least 2.5 mm high. Letters should always be open and formed with a dense but not wide line.

14-3.02 Plotting Survey Data

The designer is responsible for plotting all survey data received as an electronic file. The *INDOT CADD System User Guide* discusses how to plot the survey data. Consultants should plot the survey data according to the procedures provided with their CADD software packages.

When plotting survey data, the following accuracies should be used to show elements on the construction plan sheets:

1. Show horizontal alignment data (e.g., curve information, equations, reference point tie-ins, section corner tie-ins to the nearest 0.001 m.

2. Show existing roadway elevations used for pavement tie-ins and vertical clearance computations to the nearest 0.01 m. Show benchmark elevations to the nearest 0.001 m.

3. All horizontal pluses, offsets, physical feature dimensions and locations, etc., may be shown to either the nearest 0.1 m or 0.01 m. As a general rule, the nearest 0.01-m accuracy is preferred.

4. Desirably, the survey should be plotted 100 m beyond the project limits. At a minimum, the survey should be plotted 50 m beyond the project limits.

14-3.03 Working Sheets

The following metric sheet sizes are generally used during project development:

1. 841 mm x 594 mm (A1). This sheet size is considered a full-size sheet and should be used for design layouts of all major projects. A border around the sheet should be provided with a 45-mm left-binding margin, 6-mm right margin, and 17-mm top and bottom margins. This provides a working area of 790 mm x 560 mm.

2. 420 mm x 297 mm (A3). This sheet size is a true half-scale of the A1 plan sheet noted in Item 1 above. This sheet is used for construction plan reviews, bid advertising, construction and project archives.

3. 297 mm x 210 mm (A4). This sheet size is generally only used on projects that do not require a significant amount of detail (e.g., district resurfacing projects). These types of projects typically only contain a plan view. If a project contains significant other information, use the A1 sheet size instead.

Until these metric sheet sizes are routinely available, the following sheets may be used in place of the metric sheets.

1. 559 mm x 864 mm (D). This sheet size may be used in place of the A1 sheet. A border around the sheet should be the same as indicated for the A1 sheet size listed above. However, the left-binding margin will be 74 mm.

2. 279 mm x 432 mm (B). This sheet size may be used in place of the A3 sheet. It should be noted that this sheet is a 45.9-percent reduction of the D size sheet.

3. 216 mm x 279 mm (A). This sheet size may be used in place of the A4 sheet.

All submittals, except the Final Tracings Submission and the final plans of projects using A4-size plan sheets, will be printed on white paper. Section 14-1.02(03) discusses the Final Tracings Submission requirements.

14-3.04 General Guidelines

The following sections provide general guidelines for plotting survey data and design details on the plan sheets.

14-3.04(01) Dimensions

When dimensioning plans, the following should be considered.

1. Dual Units. Show all dimensions in metric measure. Do not use dual units.

2. Bridge Plans. Show all bridge plan detail dimensions including span lengths, floor slab widths, etc., in millimeters. Show all non-structure dimensions on the general plan and layout sheets in meters.

3. Road Plans. Road plan sheets will typically be prepared using meters. However, if the large majority of the dimensions of a drawing or detail are either in meters or millimeters, then show all dimensions using the same symbol unit.

4. Traffic Plans. Traffic plan sheets will use either meters or millimeters, depending upon the element shown. However, if the large majority of the dimensions of a drawing or detail are either in meters or millimeters, then show all dimensions using the same symbol unit.

5. Common Units. Where all or most of the units are shown in one set of dimensions (e.g., mm or m), a footnote can be added to the sheet stating this fact. For example, *"All dimensions are in millimeters (mm) except as noted."* Remove the mm or m symbol from the plans to improve the sheet clarity.

6. Spaces. Provide a space between the number and symbol (e.g., 3.6 m).

7. Decimals. Only use decimals to denote fractions. For values less than one, place a zero before the decimal marker (e.g., 0.75 m).

8. Large Numbers. Generally, for numbers greater than four digits use a space to separate blocks of three digits (e.g., 12 000 m^2) and for numbers with four or less digits, do not use a space (e.g., 3600 mm). For plan dimensions, it will be satisfactory to either insert or omit the space as desired.

14-3.04(02) Symbols and Legends

Chapter Fifteen presents the Department's CADD symbol library. These symbols should be used in the preparation of all manual and CADD drafted construction plans. To obtain a copy of this library, the designer should contact the Graphics Engineering Section.

Figure 14-3A, Recommended Plan Legends, presents the legends that may be used on the construction plans. For traffic symbols and legends that should be used within a set of plans, see Chapter Fifteen. Circles with either a letter or number may be used to indicate various construction items or materials. Where additional items are similar but with different thicknesses, layers, weights, etc., note them with an alphanumeric combination [e.g., (A1) 350 mm Plain Cement Concrete Pavement, (A2) 250 mm Plain Cement Concrete Pavement]. The legend should be consistent throughout a set of plans (i.e., each number or letter applies to an individual item throughout a set of plans). Do not renumber the legends on each sheet to account for the unused legends. List the legends used on a sheet in an open area on the sheet.

14-3.04(03) Text

Chapter Fifteen presents the Department's criteria for text sizes, fonts and line weights. For each sheet type, use uniform text sizes and line weights. For example, all the text for notations in the plan view should be the same size and weight. However, the text for the summary table may use a different text size. Note that the font type should be uniform throughout the plans.

Desirably, word abbreviations should not be used (i.e., completely spell out the word); however, this is not always practical. Figure 14-3B, Plan Abbreviations, presents the common abbreviations that should be used where it is necessary to abbreviate words. Spell out the words for those terms not listed in Figure 14-3B.

For metric units, all symbols should be shown in lower case except for liter (L), mega- (M) derivations, and those derived from proper names [e.g., newton (N)].

14-3.04(04) Plan Notes

Specific plan notes (e.g., dimensions, clarifications) should be placed directly on the applicable sheet. General notes which apply to the whole project or several sheets should be placed on the Index and General Notes Sheet. The types of notes that are acceptable for placement in the plans are as follows:

1. a specific reference to a drawing on a sheet;
2. a note with an arrow drawn to a part of a drawing it complements;
3. utility owners;
4. soil boring information;
5. cross references to other plan sheets or INDOT *Standard Drawings*;
6. hydraulic data;

7. earthwork table or balance information;
8. bridge seat calculation procedure;
9. legends;
10. screed instructions;
11. bench mark data;
12. traffic signal diagram description;
13. Sign Summary description notes;
14. all tables; and
15. Structure Data Sheet remarks.

Notes which describe the particular work, material requirements, construction requirements, method of measurement and/or basis of payment are considered to be specifications and should not be included on a set of plans. These notes should be included in the INDOT *Standard Specifications*, Supplemental Specifications, Special Provisions or Recurring Special Provisions. Chapter Nineteen provides guidance on the use and preparation of these specifications.

14-3.04(05) Miscellaneous

The following presents several guidelines the designer should consider when preparing a set of construction plans:

1. Stationing. INDOT uses a metric stationing of 1 km which is shown to three decimal places (e.g., 1 + 000.000). Show "tic" marks at 100-m intervals. These tic marks are shown on the left side of the centerline. Note a full station at every 500-m interval with plus stations at 100-m intervals. For an example, see *INDOT Typical Plan Sheets.*

   For example, Sta. 12+273.96 indicates a point 273.96 m forward of kilometric Sta. 12+000. The Design Division's Location Surveys Unit has adopted the practice of using an equivalent conversion from english to metric units when re-establishing points from an english units survey. For example, P.I. Sta. 456+35 from a 1965 english units survey would be defined as kilometric P.I. Sta. 13+909.548 (456.35 eng sta x 0.03048 km/eng sta = 13.909548 km) in a metric units survey. The location of the first even-kilometer station on a new alignment is arbitrary.

2. Cross Section Intervals. Desirably, use 20-m cross section intervals where the alignment is maintained over existing embankments and through rolling terrain. A larger interval may be used where uniform templates are used over flat terrain. Provide additional cross section intervals where there are abrupt changes in either the typical section or the existing ground.

3. Angles. Express angles in degrees, minutes and seconds.

4. North Arrow. Provide a uniform North arrow on the finished set of plans. Chapter Fifteen illustrates the appropriate North arrow that should be used.

5. Reduction. A full-sized set of mylar (reproducible) plans is required for construction and contract letting. Section 14-3.03 discusses the sheet sizes that are used by the Department. Scales used for drafting the full-size sheets are no longer accurate when the plans are reduced. When the plans are reduced, readability of the plans may become critical. Chapter Fifteen and the *INDOT CADD System User Guide* present the minimum text sizes that should be used.

6. Limits. The limits of plan coverage on a typical road plan sheet will vary according to the plan and profile scale selected and type of plan sheet selected. Section 14-3.05 discusses the various scales that should be used.

7. Plan Sheets. The Department's typical plan sheets can be obtained from the INDOT CADD library.

8. Alignment Placement. Where the horizontal alignment is on tangent, the centerline or survey line should parallel the top border and be centered vertically in the plan view space. Where the horizontal alignment is on a curve, tangents should be angled to produce reasonable balance. Desirably, keep an entire curve on the same sheet.

9. Project Blocks. Each sheet will have a project block along the bottom of the sheet. The project block will vary from sheet to sheet. These are illustrated in the *INDOT Typical Plan Sheets* document published separately from this *Manual*. In general, the following information, from left to right, should be included in the project block.

    a. Design Information. In the lower left-hand corner of the plan and profile sheets, include the horizontal alignment references. For most other sheets, this area will be left blank.

    b. Engineer's Stamp. The engineer's stamp is required on all design sheets along with the signature of the engineer and date signed. Note that the stamp may vary within the plans depending on the engineer who prepared the sheet.

    c. Signatures. The signature block will include the signatures for the design engineer, designer, drafter and checkers.

    d. Sheet Title. Each sheet should be labeled.

e. Scales. Where applicable, note the scales used on the drawing in the lower right-hand corner.

f. File Numbers. Note all applicable file and references including contract number, bridge file, designation number, survey book, etc., in the lower right-hand corner.

g. Sheet Number. Provide the sheet number and the total number of sheets for the project in the lower right-hand corner of the sheet. Number all sheets sequentially including the Title Sheet. Sheets that are added after the sheet numbers have been placed on the plans should be numbered A, B, C, etc., and noted in the index. These additional sheets are not included in the total number of sheets. In general, the sheet numbering should be the last thing the designer does prior to submitting the Final Tracings to the Records Unit.

h. Survey Lines. If there are multiple survey lines, indicate the line designation with the sheet title (e.g., Plan and Profile Line "S-1-A").

14-3.04(06) Title Sheet Information Block

The information block on the title sheet should conform to the format shown in Figure 14-3C. Part V contains geometric design tables which reflect the scope of project construction. The applicable design criteria in such tables is based not only on traffic volume characteristics, but also on road classification, rural or urban setting, type of terrain, and access control. The information block will have all of these design controls defined in one location. Anyone looking at the plans will immediately know which geometric design table and what design criteria were used in the project development.

14-3.05 Scales

The following Sections present the recommended drawing scales that should be used when developing a set of construction plans. The selected scales should be noted in the project block on every sheet. Where no scales are used, this should be noted in the project block.

14-3.05(01) Road Projects

For road projects, use the following scales.

1. Title Sheet. For most location maps, use a 1:25 000 scale. Location maps for urban areas may use a 1:10 000 scale for better clarity. For longer projects, a scale of 1:50 000 may be necessary.

2. Typical Sections. The scale for the typical section figures, commonly 1:50, is generally at the designer's discretion. The scale selected should adequately show the necessary features. Although not desirable, the scale may vary from typical section to typical section. The vertical scale may be exaggerated to adequately show the pavement cross section.

3. Right-of-Way Sheets. The appropriate scale for the right-of-way sheet will depend on the plat sheet used. The following will apply.

    a. Route Survey Plats. For route survey plats, use a scale of 1:2500.

    b. Plat No. 1. In rural areas, use a scale of 1:5000 and, in urban areas, 1:1000. For spot improvement projects (e.g., small structure replacement, sight distance improvements), a scale of 1:2500 may be used.

    c. Plat No. 3. In rural areas, use a scale of 1:5000 and, in urban areas, 1:1000. In some intermediate areas, a scale of 1:2500 may be used.

4. Plan and Profile Sheets. Plan and profile views will typically be shown together on one sheet (i.e., the plan view on top and profile view on the bottom). The following scales are typically used on plan and profile sheets.

    a. Plan View (Rural). For most projects, use a scale of 1:500. For longer rural projects, a 1:1000 scale may be used.

    b. Plan View (Urban). Depending upon the complexity of the location and work to be accomplished, a scale of 1:200 or 1:500 will normally be used.

    c. Profile View (Horizontal). The horizontal profile scale will be the same scale as the plan view.

    d. Profile View (Vertical). The vertical profile scale will be 1:50 or 1:100 depending on the complexity of the project and the plan view scale selected. Typically, a 1:100 scale will be used with a plan view scale of 1:1000, and a 1:50 scale will be used with plan view scales of 1:500 and 1:200.

Other scales, as necessary, may be used to provide better clarity or more practical layouts. If a detail can not be adequately viewed in the selected scale, show the element on a Detail Sheet.

5. Superelevation Transition Sheets. The selected scale for superelevation sheets will generally be left to the designer's discretion. Select a scale which will adequately show the necessary features.

6. Detail Sheets. The selected scale will vary based on the complexity of the detail and room available on the sheet. The following provide the typical scales that are commonly used on detail sheets.

   a. Construction Details. Use a plan view of 1:200.

   b. Intersection or approach drawings. Use a plan view scale of 1:200.

   c. Spot Elevation Sheets. Use a plan view scale of 1:200.

   d. Signing Sheets. The plan view scales for sign location sheets will be 1:500 for urban areas and 1:1000 for rural areas.

   e. Signal Sheets. The plan view scales for signal sheets will usually be 1:200.

   f. Pavement Markings. For most projects, use a plan view scale of 1:500. Where significant detail is required, use a plan view scale of 1:200.

   g. Traffic Maintenance Details. Use a plan view of 1:500 or 1:1000.

   The designer may select an alternative scale for any of the above details based on the complexity of the detail and room available on the sheet. For those details not listed, the designer will determine the scale on a detail-by-detail basis.

7. Cross Sections. For most projects, the horizontal and vertical cross section scales will typically be 1:100. A larger scale may be used where a greater cross section width or height is required.

14-3.05(02) Bridge Projects

Many of the sheets for bridge projects (e.g., Index and Title Sheet, Typical Cross Sections, R/W Plat Sheets, Plan and Profile Sheets, Cross Sections) will use the same scales as listed in Section

14-3.05(01) for a road project. The scales for the structural details will vary according to the complexity of the drawing and room available on the sheet. The designer should select a scale which will adequately show the necessary detail and still allow the detail to be readable at a reduced scale. Typically, scales for the Layout Sheet should be 1:500. For complex urban projects and projects in steep rural areas, a 1:200 scale may be used.

14-3.05(03) Traffic Projects

For signing, signal and lighting projects, the following scales should be used to develop the construction plans.

1. Title Sheet. For most location maps, use a 1:25 000 scale. Location maps for urban areas may use a larger scale for better clarity. For longer projects or projects scattered throughout a District, it may be necessary to use a scale of 1:50 000 or smaller.

2. Plan Sheets. The selected scale will depend upon the type of project selected:

    a. Signing Sheets. The plan view scales for sign location sheets will typically be 1:500 for urban areas. For rural areas, depending on the project complexity, the scale will be 1:1000 or 1:2000.

    b. Signal Sheets. The plan view scales for signals at intersections will usually be 1:200. Where details are required between intersections (e.g., interconnect details), the scale may be 1:1000 or 1:500.

    c. Lighting Sheets. The plan view scales for lighting location sheets will typically be 1:500 in urban areas. For rural areas, depending on the project complexity, the scale will be 1:1000 or 1:2000.

3. Details. The selected scales for traffic details will be determined on a case-by-case basis depending on the complexity of the detail and room available on the sheet.

4. Cross Sections. Where cross sections are required, the horizontal and vertical cross section scales will typically be 1:100. A larger scale may be used where a greater cross section width or height is required.

14-3.06 Plan Sheet Accuracies

The accuracy of plan dimensions should be consistent with data upon which they are based. Accuracy for dimensions to be shown on plans is provided in the following sections.

14-3.06(01) Road and Traffic Plans

The following accuracies typically should be observed when preparing the construction plans.

1. Stationing. Show all stationing to the nearest thousandth of a meter (i.e., 0 + 000.001). This will include PVI, PC, PI, PT, equation stations, etc.

2. Angles. All angles and bearings used in the plans should be shown to the nearest second (i.e., 0º 00′ 01″).

3. Horizontal Alignment Data. Figure 14-3D, Horizontal Curve Data (Plan Sheets), presents the order and rounding accuracy that should be used to present curve data.

4. Vertical Profile Data. The following vertical alignment accuracies should be used.

    a. P.V.I. Stationing. Show P.V.I. stations at even 10-m stations.

    b. Vertical Curve Lengths. Show vertical curve lengths in 10-m increments.

    c. P.V.I. Elevations. Show P.V.I. elevations to the nearest 0.001 m.

    d. Grades. Show vertical grades on the plans to the nearest 0.001%.

    e. Vertical Clearances. Show all vertical clearances to the nearest 0.005 m.

5. Elevations. The following elevation accuracies should be used.

    a. Bench Marks. Show bench mark elevations to the nearest 0.001 m.

    b. Flow Line Elevations. Show these elevations to the nearest 0.01 m.

    c. Pavement Elevations. For existing pavements, show the elevation to the nearest 0.01 m.

    d. Ground Lines. Show existing ground lines to the nearest 0.01 m.

e. Other. Show all other vertical elevations, breaks in ditch grades, pipe invert elevations, etc., to the nearest 0.01 m.

6. Contour Intervals. Contour intervals will typically be in 0.2-m increments. Each fifth contour representing an even meter elevation should be emphasized and annotated. Intermediate contours will not be noted unless they represent a high or low contour. In rugged terrain or on steep slopes, the intermediate contour lines may be removed for clarity.

7. Topography Features. Show the location of all proposed features to the nearest tenth of a meter (i.e., 0.1 m), where practical.

8. Typical Cross Section Elements. The following will apply.

a. Widths. Show all typical cross-section elements in increments of 0.1 m. This includes lane and shoulder widths, ditch widths, bench widths, median widths, sidewalks, etc.

b. Cross Slopes. Show cross slopes to the nearest tenth of a percent (i.e., 0.1%) including superelevation rates.

c. Pavement Depths. Bituminous pavement course thicknesses should be shown to the nearest 5 kg/m^2. Show all other pavement elements (e.g., concrete pavement thickness, aggregate and subbase depths, special subgrade treatment depths, underdrain dimensions) to the nearest 0.01 m.

8. Cross Section Elements. Show the profile grade elevation to the nearest 0.001 m.

9. Miscellaneous Items. For the following features, show the dimensions to nearest increment indicated as follows:

a. drive locations ~ 1.0 m;
b. culvert locations 1.0 m;
c. guardrail ~ 0.1 m; and
d. ditch grade breaks ~ 1.0 m.

14-3.06(02) Bridge Plans

In addition to the plan accuracies discussed for road plans, use the following accuracies on bridge plans.

1. Bridge Elements. Many bridge elements can be shown in increments of 100 mm (e.g., footing lengths, span lengths, beam spacings, pier heights). Where increments of 100 mm are not practical, use 50-mm or 10-mm increments.

2. Reinforcing Bars. Where practical, show the length of straight bars to the nearest 100 mm and bent bars to the nearest 20 mm total length. Show spacing of reinforcing bars to the nearest 5 mm.

3. Dimensions. Use the following accuracy for dimensions in bridge plans:

    a. Concrete Details. Many concrete details can be shown in increments of 10 mm (e.g., slab decks, columns, wall thicknesses, cap dimensions, footing widths, pile spacings). Where increments of 10 mm are not practical, use 5-mm or 1-mm increments.

    b. Camber and Deflection Details. Show camber and dead load deflections to the nearest 1-mm increment.

    c. Structural Steel Details. For designations, dimensions and properties of structural shapes, see ASTM A6M Specification and the AISC metric shape tables. Other dimensions on steel detail sheets (e.g., plate widths, plate lengths, splice details, hole spacings, steel shoe assemblies) should be dimensioned to the nearest 5 mm. Plate thickness can be shown to the nearest 1-mm increment.

    d. Precast Prestressed Concrete Shapes. Show all cross-section dimensions for these elements to the nearest 1 mm.

    e. Manufactured Items. Accuracy for detailed dimensions for these items (e.g., expansion joints, bearing devices) should be in accordance with industry standards.

    f. Horizontal Alignment Tie-Up. Show these dimensions to the nearest 1 mm.

4. Elevations. Show structure elevations, including top of bearing plate elevations, to the nearest 0.001 m, except as follows.

    a. Top of Pile Elevations. Where piles are encased in concrete caps, show the top of pile elevation to the nearest 0.01 m. Where superstructure beams are attached to the piling, show the top of pile elevation to the nearest 0.001 m.

b. Existing Structures. Show existing structure elevations and concrete removal line elevations to the nearest 0.01 m.

c. Ground Elevations. Show all ground elevations (e.g., berm elevations, channel clearing, upper limit of wet excavation) to the nearest 0.01 m.

5. Bridge Quantities. Chapter Seventeen presents the rounding criteria for bridge quantities that are also shown on bridge plans.

14-3.07 Plan Sheet Organization

To provide consistency from project to project, the construction plan sheets should be assembled in the sequence listed in the following sections for the applicable project type. The designer should note that not all plans will have all sheets and that several sheets can be combined together (e.g., Detail Sheets). In general, all project types not listed below should use the sequence presented for road design projects.

14-3.07(01) Road Projects

The recommended plan sequence for road projects is as follows:

1. Title Sheet;

2. Index and General Notes;

3. Typical Cross Sections;

4. Plat No. 1 or Plat No. 3;

5. Geometric Tie-Up Sheet;

6. Traffic Maintenance Details. A sheet is not required for an official-detour route. A diagram thereof may be included in the Contract Information book;

7. Plan and Profile;

8. Superelevation Transition Diagrams

9. Detail Sheets, in the order as follows:

    a. Construction Details;
    b. Intersection Detail;
    c. Spot Elevation Detail;
    d. Channel Detail;
    e. Geometric Detail;
    f. Right-of-Way Detail;
    g. Grading Plan;
    h. Drainage Detail;
    i. Erosion Control Detail (plan view);
    j. Retaining Wall Details;
    k. Wetland Mitigation Details;

10. Traffic Details, in the order as follows:

    a. Signs (where separate signing plans are not required);
    b. Signals;
    c. Lighting (where separate lighting plans are not required);
    d. Pavement Markings;

11. Miscellaneous Tables;

12. Approach Table;

13. Underdrain Table;

14. Guardrail Summary Table;

15. Structure Data Table;

16. Pipe Material Sheet; and

17. Cross Sections.

14-3.07(02) Bridge Projects

The recommended plan sequence for bridge projects is as follows:

1. Index and Title Sheet;

2. Typical Cross Sections;

3. Traffic Maintenance Details. A sheet is not required for an official-detour route. A diagram thereof may be included in the Contract Information book;

4. Road Plan and Profile Sheets;

5. Superelevation Transition Diagrams;

6. Roadway Details, in the order as follows:

    a. Construction Details;
    b. Intersection Detail;
    c. Spot Elevation Detail;
    d. Geometric Detail;
    e. Right-of-Way Detail;
    f. Grading Plan;
    g. Drainage Detail;
    h. Erosion Control Detail (plan view);

7. Traffic Details, in the order as follows:

    a. Signs (where separate signing plans are not required);
    b. Signals;
    c. Lighting (where separate lighting plans are not required);
    d. Pavement Markings;

8. Soil Borings;

9. Channel Change Layout;

10. Layout;

11. General Plan;

12. Structure Detail Sheets, in the order as follows:

    a. Coping Offsets and Tie-up Dimensions;
    b. Abutment/Bent/Pier Details and Bill of Materials;
    c. Framing Plan and Girder Elevation;
    d. Structural Steel Details/Precast Beam Details;

e. Jacking Frames;
f. Bearing Details;
g. Floor Details;
h. Corner Details and Floor Bill of Materials;
i. Railing Details;
j. Expansion Joint Details;
k. Screeds (optional);

13. Special Bridge Approach Slab Details;

14. Bridge Summary;

15. Miscellaneous Tables;

16. Approach Table;

17. Underdrain Table;

18. Guardrail Summary Table;

19. Structure Data Table;

20. Pipe Material Sheet; and

21. Cross Sections.

14-3.07(03) Signing Projects

The recommended plan sequence for signing projects is as follows:

1. Title Sheet;
2. Index and General Notes;
3. Signing Plan;
4. Sign Layout;
5. Cross Sections;
6. Footing Details; and
7. Structural Details.

14-3.07(04) Signal Projects

The recommended plan sequence for signal projects is as follows:

1. Title Sheet;
2. Index and General Notes;
3. Signal Plan; and
4. Signal Details.

14-3.07(05) Lighting Projects

The recommended plan sequence for lighting projects is as follows:

1. Title Sheet;
2. Index and General Notes;
3. Lighting Plan; and
4. Cross Sections.